



## ISS Commercial Resupply Services

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**Augustine Committee** 

**UPDATED:** Corrected page 10 (replaced "first stage" with "second stage")



### Beyond Shuttle International Partner, Commercial Services, and Orion



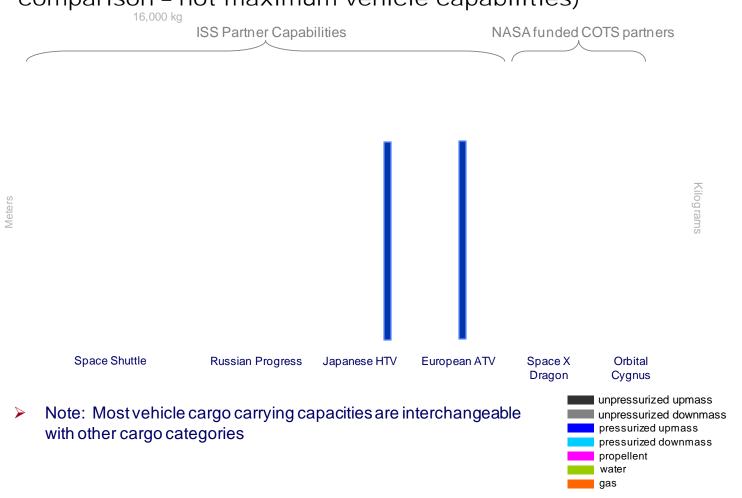
- Shuttle Retirement in 2010 drastically diminishes ISS upmass / return capability
- Other vehicles will be required to close the gap in upmass and downmass shortfalls
  - ISS has procured services from Roscosmos
    - Crew transportation and rescue services through spring 2013
    - Cargo delivery and disposal services through 2011
  - Automated Transfer Vehicles (ATVs) and H-II Transfer Vehicles (HTVs) will provide USOS delivery and disposal capability
  - ISS Commercial Resupply Services procurement to procure logistics services for the remaining upmass and return shortfall
- Orion Crew Exploration Vehicle (CEV) will provide crew transportation and rescue services to USOS and partner crewmembers
  - Orion will provide crew transportation and rescue services for up to 4 crewmembers



## Beyond Shuttle ISS Mixed Cargo Fleet



Russian Progress, European ATV, Japanese HTV and domestically developed commercial vehicles (average mission comparison – not maximum vehicle capabilities)





### ISS Commercial Resupply Services Procurement Background



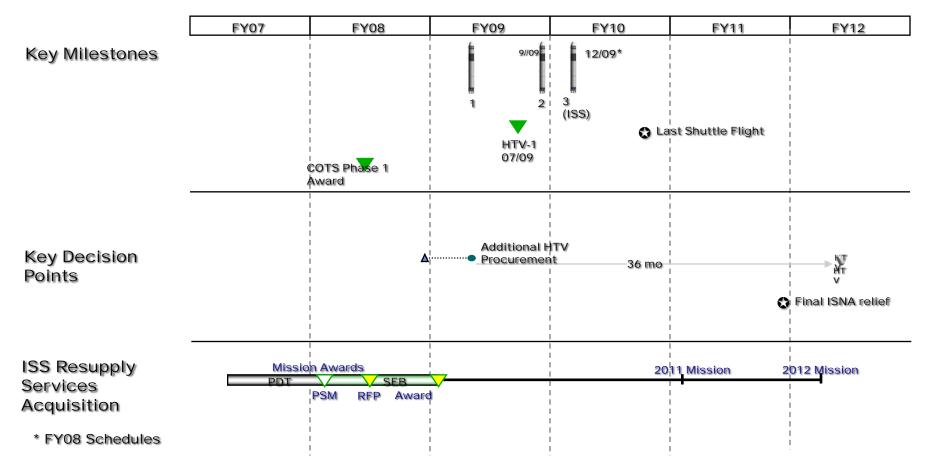
- NASA conducted a detailed procurement development activity to determine the best way to contract for the remaining cargo resupply need.
  - The Commercial Space Transportation Services Request For Information (RFI) was released on August 7, 2007, to solicit feedback from industry. All day one on one sessions were conducted with ESMD/SOMD/ISS management and industry.
  - This RFI feedback was reviewed at the agency level Strategy Management Council and used to develop the draft RFP.
  - In addition, NASA released a draft solicitation for industry comment and held further formal communications on the procurement with industry on March 17<sup>th</sup>, 2008.
- The Request For Proposal (RFP) for ISS Commercial Resupply Services was released on April 14<sup>th</sup>, 2008.
- The RFP identified the following requirements and the mission rate NASA procured met those needs:

		CY10	CY11	CY12	CY13	CY14	CY15	Total
Internal Upmass - Customer Cargo	(MTs)	2.7	4.8	6.7	6.2	11.0	8.2	39.6
External Upmass - Customer Cargo	(MTs)	-	4.3	2.4	5.3	3.1	4.8	19.9
Return Downmass - Customer Cargo	(MTs)	0.5	1.5	1.5	1.5	1.5	1.5	8.0
Disposal Downmass - Customer Cargo	(MTs)	1.5	5.0	5.0	5.0	5.0	5.0	26.5



# Why Procure in 2008? (Using 2008 historical schedule dates)





 After the RFI, industry feedback and NASA analysis indicated that CRS procurement needed to begin in 2008 for missions to be available in 2011.



# ISS Commercial Resupply Services Procurement Overview



- The ISS Commercial Resupply Services contract is a new way to provide resupply capability for the ISS.
  - Instead of procuring a vehicle, the ISSP procured an end to end resupply service to the ISS vehicle.
- An end-to-end resupply service encompasses all work required to integrate launch vehicle, orbital vehicle, and cargo to perform cargo resupply missions to the ISS.
- The contract is a fixed price contract for a standard resupply service that will support the following capabilities –
  - Internal (pressurized) Cargo Upmass
  - External (unpressurized) Cargo Upmass
  - Cargo Return
  - Cargo Disposal
- On December 23<sup>rd</sup>, 2008, NASA awarded two CRS contracts.
  - SpaceX twelve missions with pressurized, unpressurized, and return capabilities.
  - Orbital eight missions with pressurized and disposal capabilities.



## **CRS Flight Rate**



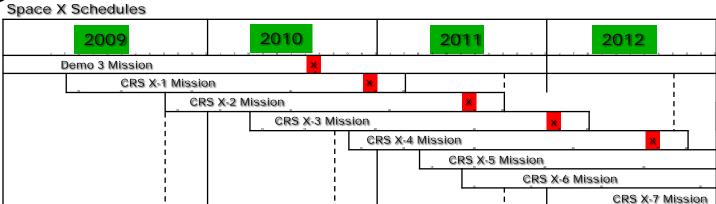
CY	2010	2011	2012	2013	2014	2015
SpaceX Falcon 9	1 Flight (Dec )	1 Flight (July)	2 Flights (Jan/Aug)	3 Flights (Jan/May/Oct)	3 Flights (Feb/Jun/Nov)	2 Flights (Mar/Jul)
Orbital Taurus 2 C30		1 Flight (Oct)	1 Flight (Jan)	0	0	0
Orbital Taurus 2 HESS				2 Flights (Jan/July)	2 Flights (Jan/July)	2 Flights (Jan/July)

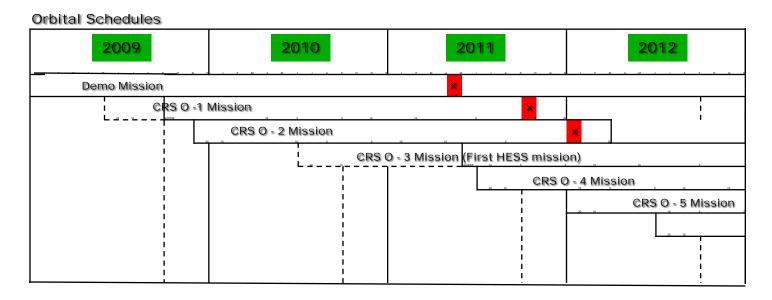
Contractor proposed dates. Work plans for 1<sup>st</sup> flights (each company) have been approved. Follow on flights are not yet approved.



# Integrated Demo/CRS Schedules (Current Schedule Baseline)







First missions are dependent on the success of the demo missions.



### ISS Commercial Resupply Services Procurement Current Activities



#### SpaceX

- ISS Integration Milestone COTS Demo Mission
  - The ISS Program works with the Commercial Crew and Cargo Program Office (C3PO) and the Partner to perform the ISS Integration activities.
    - The ISS Program ensures that the visiting vehicle meets the requirements to safely approach the ISS, the integrated hardware and software interfaces work, and the robotic operations perform as required.
  - Total mission payments are capped at 30% of the total mission price until ISS Integration is complete.
- Post award contract kick off held with SpaceX on March 12<sup>th</sup>.
- First mission (December 2010)
  - The authority to proceed (ATP) payment has been made.
  - The first mission's Vehicle Baseline Review (VBR) and quarterly management review will be held on June 30<sup>th</sup>-July 1st.
    - NASA and SpaceX agree to the binding 90 day mission window at the VBR.
    - The contractor must provide mission level schedules, including missions with the same vehicle configuration that may impact the mission's schedule.
- Cargo Integration and mission planning has begun with the program.
- Second mission ATP is currently scheduled for October 2009 (July 2011).



# ISS Commercial Resupply Services Procurement Current Activities



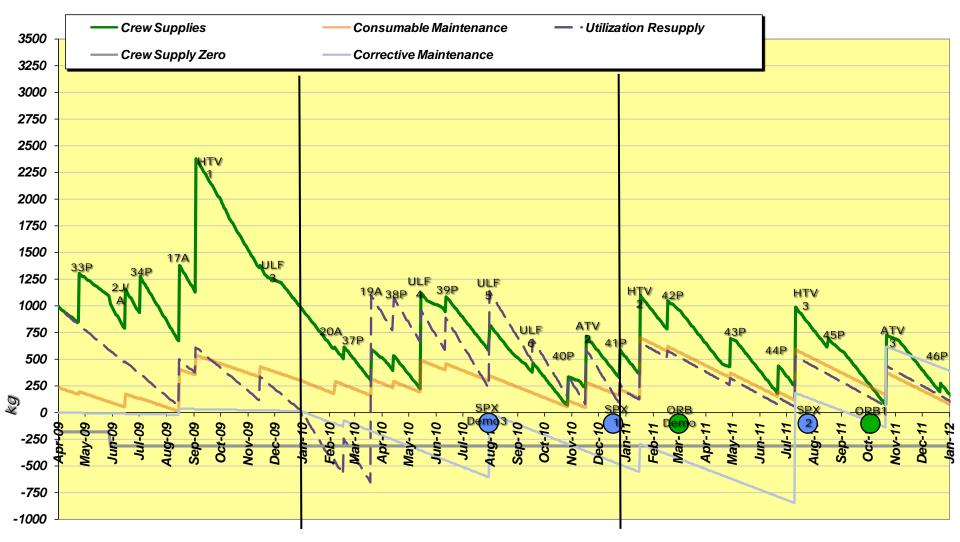
#### Orbital

- ISS Integration same ISS Integration process and milestone payment cap is required.
- Two configurations procured from Orbital.
  - The Taurus II launch vehicle configuration (solid second stage) for the first two missions.
  - The HESS launch vehicle configuration (liquid second stage) for the remaining missions.
- Post award contract kick off held with Orbital on March 19<sup>th</sup>.
- First mission (October 2011)
  - First ATP payment scheduled for June 2009.
  - The first contract quarterly management review will be held in mid June.
  - The first mission Vehicle Baseline Review estimated to be in April 2010.
- Second mission ATP (Preliminary mission date of January 2012) is scheduled for October 2009.
- Both contractor's schedules are very compressed and it is very likely that the mission windows for the initial flights established at the VBR will be 3 – 6 months later than what is in the task order.
- The ISS has assessed the impact of the CRS slips and is prepositioning and evaluating other options to maximize their upmass and protect for those slips.











# ISS Commercial Resupply Services Procurement Summary



- Two contracts were awarded to mitigate the risk of being dependent on a single contractor.
- Both contractors are proceeding in their development process through the COTS Space Act process. The ISS works with C3PO in that process but is responsible for the ISS Integration and ensuring that the visiting vehicle can interface safely.
- Contract activities have begun and insight into milestone progress is required as part of their compliance to the contract requirements.
- Both contractors have a great deal of work ahead of them but NASA has built some margin into planning to mitigate likely schedule slips.